

## **SITUATION AND LAYOUT FOR HIGHWAY & WATERWAY CROSSINGS**

### **GENERAL**

- Refer to the Bridge Design Manual page B17.1 for plan sheet format data.
- Lengths should be shown in feet.
- Elevations should be shown in feet.
- The Situation and Layout data shall be the first drawings of the structure plans and shall consist of the following plan sheets.

Sheet 1 of the final plans shall contain the following items:

PLAN  
ELEVATION  
PROFILE DATA  
HORIZONTAL ALIGNMENT DATA  
HYDRAULIC DATA  
TRAFFIC DATA  
INDEX OF SHEETS  
QUANTITIES

Sheet 2 of the final plans shall contain the following items:

DESIGN NOTES  
GENERAL NOTES

- The PRELIMINARY Situation and Layout data should include a third sheet if necessary showing the following data:

Typical section (Could be put on sheet 1 and then removed on final plan preparation)

Curb-curb and out-out widths  
Sidewalk and curb widths  
Type of railing  
Slab thickness  
Slab reinforcement cover for both mats  
Girder type and spacing  
Centerline and profile grade point  
Crown slope

Design features

Show enough details of design features to clarify the concept. This should include abutment and pier/bent elevations and/or sections.

- The Title Block shall be completed as follows:

Sheet Title: SITUATION AND LAYOUT

Project Description: The project description shall include the following:

Total length of a bridge to the nearest foot and clear span length of a culvert to a tenth of a foot.

Type of main supporting member

Names of features involved in the crossing

Examples:

262' STEEL GIRDER UNDERPASS  
ROBERTS I.C.  
I-15 STA 300+77.51 SH-48 STA 29+46.79

256' PRESTRESSED CONCRETE BRIDGE  
E. BRIDGE ST. OVER WEISER RIVER  
STA 8+24.78

15' CONCRETE BOX CULVERT  
US-95 OVER CALF CREEK  
STA 289+30.00

Bridge Inspection Master Key: Obtain the correct number from Bridge Inspection. Only those structures that carry highway traffic or cross a highway require a number. The number needs to be shown only on sheet 1.

### **PLAN VIEW**

- Title the view PLAN and show the scale factor below the title.
- Show the total length of structure (out -out of backwalls) along the survey line.
- Show the abutment/pier number, station, and finished grade elevation at the intersection of the abutment/pier centerline and the survey line at the following locations:
  - Begin/End of structure
  - Centerline bearing of abutments
  - Centerline of piers/bents
- Show the span lengths along survey line as follows:
  - Single Spans or End Spans: abutment centerline bearing - centerline pier/bent
  - Interior Spans: centerline pier/bent - centerline pier/bent
- Show the total bridge width (out - out). The width should include the parapet, curb or sidewalk.
- Show the curb-to-curb width.
- Show the roadway lane and shoulder widths.
- Show the lane direction and name of closest town/geographical feature in that direction.
- Show the North arrow.
- Show the intersection angle if not a 90° crossing.
- Show the horizontal and vertical clearances as follows:
  - Highway Crossings: Show the point of minimum vertical and horizontal clearance for the highway.
  - Stream Crossings: Show the point of minimum clearance above Q<sub>50</sub> high water elevation.
- Identify the survey and profile lines.
- If the new structure is at or adjacent to an existing bridge, show enough details of the existing bridge to insure that all possible conflicts are taken into account in the layout of the new bridge. As-built plans or field measurements should be used to accurately depict the existing bridge.
- If the existing bridge is to be removed, show the drawing number of the existing bridge plans.
- Orientation of the PLAN view shall allow the ELEVATION view to be a direct projection beneath the PLAN view.
- Stationing for bridges shall be along the centerline of structure and shall advance from left to right on the sheet.
- Stationing for culverts shall be along the centerline of structure and shall advance from bottom to top of the sheet.
- Show the limits of riprap. If riprap is not included in the structure bid items, add a note referencing the roadway pay items.
- Contour lines, if shown, should not project through the structure limits, dimension lines, or notes. Contour lines should be drawn in gray tones so they will not dominate the PLAN view.
- Show any utilities crossing the structure and show the location of any deck drains.
- Show the location of a Survey Cap at the top of the parapet or curb. The note should read, "A Survey Cap will be furnished by the State and shall be installed by the Contractor".

#### ELEVATION VIEW

- Title the view ELEVATION and show the scale factor below the title.
- Show the total length between abutment centerlines of bearing along the survey line.
- Show the abutment/pier number and station at the following locations:
  - Centerline bearing of abutments
  - Centerline of piers/bents
- Show the span length.
- Show the span number for multi-span bridges.
- Identify the type of fixity between the substructure and superstructure at the abutments and piers/bents using the following designations:
 

E	Expansion
P	Pinned
F	Fixed
- Show the minimum vertical clearances as follows:
  - Highway Crossings: Show the minimum vertical clearance for the highway to the nearest tenth of a foot and locate the point.
  - Stream Crossings: Show the minimum clearance above Q<sub>50</sub> high water elevation to the nearest tenth of a foot and locate the point.
- Show the natural ground line along the centerline of structure.
- Show the abutment slopes and call out the slope perpendicular to the stream or highway.

- The ELEVATION view should be a projection of the PLAN view. Show the end projection only for the abutments and piers. Showing the actual projection for skewed bridges is confusing.
- Show the roadway approach guardrail and reference the roadway plans for details.

#### PROFILE DATA

- Title the view PROFILE DATA. The view can be drawn "Not to Scale".
- Show the profile grade across the structure.
- Show the location of the structure on the alignment.
- Show begin/end of bridge station and elevation.
- Show the profile grades for all highways involved in the crossing.
- Show the following vertical curve data:
  - Stations and elevations at point of curvature, point of intersection, and point of tangency.
  - Length of vertical curve
  - Incoming and outgoing grades in percent

#### HORIZONTAL ALIGNMENT DATA

- Title: HORIZONTAL ALIGNMENT DATA.
- Show the stations at point of curvature, point of intersection, and point of tangency on the PLAN view if possible. If not possible, list the stations in the curve data.
- Show the following horizontal curve data:
  - $\Delta$ , T, L, R, S, RL, and Z.
  - Horizontal curves shall be described by the degree of curve.
- Show the superelevation transition data if applicable. Cross-sections at the control points are recommended.
- If the structure is on a tangent alignment, show the bearing in the PLAN view.

#### HYDRAULIC DATA

- Title: HYDRAULIC DATA
- Show the following hydraulic data for streams and rivers:
 

<u>FLOOD</u>	<u>DISCHARGE</u>	<u>H.W. ELEVATION</u>	<u>VELOCITY</u>
Design ( $Q_{50}$ )	cfs	ft	fps
Base ( $Q_{100}$ )	cfs	ft	fps
Scour ( $Q_{sc}$ )	cfs	ft	fps
- Show the following hydraulic data for canals:
 

Canal Flow	cfs
H.W. Elevation	ft
Velocity	fps
Flow controlled by _____ Canal Company.	
- Hydraulic data is not required for minor structure rehabilitation or extension projects.

#### TRAFFIC DATA

- Title: TRAFFIC DATA.
- Show the following traffic data for the year of construction and 20 years past the year of construction:
  - Current ADT
  - Future ADT
  - Current ADT % Trucks
  - Future ADT % Trucks
  - Design Speed
- Show the data for all highways involved in the crossing.

#### INDEX OF SHEETS

- Title: INDEX OF SHEETS
- The bridge plans shall be numbered independently from the roadway plans and shall start with sheet 1.

#### QUANTITIES

- Title: QUANTITIES.

- Show all the bid items listed on the cost estimate for the structure except Mobilization.
- The quantities do not need to be shown until the final plans are prepared.

DESIGN & GENERAL NOTES

The Design Notes shown on page B17.2A – B17.2E of the Bridge LRFD Manual are intended to be used as a checklist for the usual situation and should be modified to fit each individual case.

- Multi-span prestressed girder bridges should include one of the following notes as specified on page 5.14.1.2.7:
  - a. Girders designed as simple spans and reinforcement added to resist negative moment.
  - b. Girders designed fully continuous for live load.
  - c. Girders designed as simple spans; slab reinforcement added to limit cracking.
- The computed and ultimate values for the Pile/Footing Design Loads should be shown on the final Situation and Layout submittal.
- Projects involving rehabilitation or repair should add the following note under CONSTRUCTION: “The contractor shall verify dimensions in the field before ordering material.”
- Projects requiring the use of Fly-Ash concrete as specified in Article 5.4 of the Bridge LRFD Manual should add the following note under MATERIAL - CONCRETE: “All concrete in this structure, except for concrete in precast prestressed girders with cast-in-place concrete decks, shall contain Type F fly ash in accordance with Subsection 502.02.”